

D2



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) EP 0 894 922 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
03.02.1999 Bulletin 1999/05

(51) Int. Cl.⁶: E05B 65/20, E05B 65/32

(21) Application number: 98114294.6

(22) Date of filing: 30.07.1998

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(72) Inventor:
Ottino, Franco Giovanni
56017 San Giuliano Terme (IT)

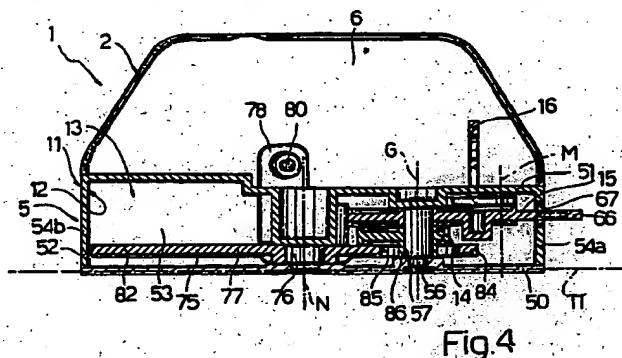
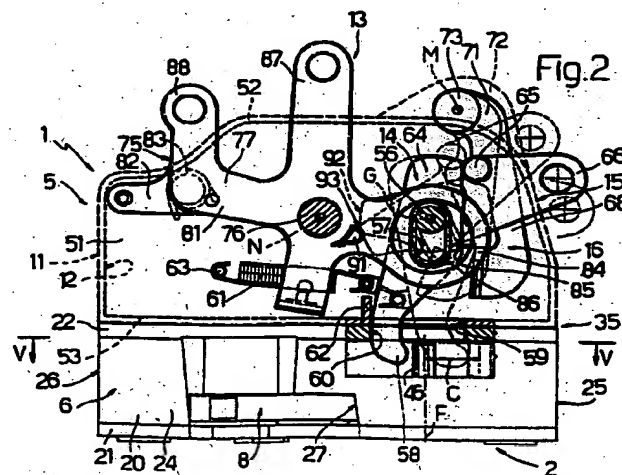
(74) Representative:
Cerbaro, Elena et al
STUDIO TORTA S.r.l.,
Via Viotti, 9
10121 Torino (IT)

(30) Priority: 31.07.1997 IT TO970692

(71) Applicant: ATOMA ROLTRA S.p.A.
86077 Pozzilli (IS) (IT)

(54) Lock for a motor vehicle door

(57) Lock (1) for a motor vehicle door comprising a support body (35), a closure mechanism (8) carried by the support body (35) and provided with a fork (9) and a stop (10) designed to connect with the fork (9) to secure it in a releasable manner in a closure position on a striker (4) and an actuation mechanism (13) for the closure mechanism (8); the actuation mechanism (13) is fitted with an external control lever (16) connectable with a door external handle to open the lock (1) from the outside, a transmission lever (14) interposed in a selectively releasable manner between the external control lever (16) and the stop (10), a safety lever (75) operationally connected to the transmission lever (14) and movable between two positions of inhibition and enabling the opening of the lock (1), and an internal control lever (15) connectable with a door internal handle to open the lock (1) from the inside; the transmission, safety and internal and external control levers (14, 75, 15, 16) are secured around respective pins (56, 76, 73) carried by the support body (35) and having axes (G, N, M) parallel to each other and orthogonal in relation to a reference plane (π), and are moved in parallel with the reference plane (π) itself.



EP 0 894 922 A1

BEST AVAILABLE COPY

Description

[0001] This invention relates to a lock for the door of a motor vehicle.

[0002] As it is known, locks for motor vehicles generally comprise a support body, a closure mechanism carried by the support body and having a fork designed to connect with a striker and a stop designed to connect with the fork to secure it in a releasable manner in a closure position on the striker itself, and an actuation mechanism for the closure mechanism, also carried by the support body.

[0003] The actuation mechanism comprises an external control lever which will connect with an external door handle to open the lock from the outside; a transmission lever interposed in a selectively releasable manner between the external control lever and the stop; a lever safety mechanism coupled operationally with the transmission lever and movable between an inhibiting position, wherein the transmission lever is arranged in releasable position between the external control lever and the stop preventing the opening of the lock, and an enabling operational position, wherein the transmission lever is arranged in securing position between the external control lever and the stop allowing the opening of the lock; and an internal control lever connectable with an internal handle of the door to open the lock from the inside, moving along an opening stroke between a rest position and an opening position, and designed to cooperate with the safety mechanism during an initial part of the actual opening stroke to displace the safety mechanism itself from the inhibition position to the enabling position.

[0004] In particular, the safety mechanism comprises a pair of levers, being respectively a safety lever and a safety actuation lever, interacting together, whereof the first cooperates with the external control lever and is designed to be actuated by means of a key from the outside of the motor vehicle, whereas the second is designed for actuation from inside the motor vehicle by means of a knob or by means of the internal control lever.

[0005] The above locks generally include a number of levers (for instance the safety lever, the transmission lever and the external control lever, and the fork and the stop) each being movable parallel with a first reference plane defined by the support body, and further levers (for instance internal control and safety control levers) moving parallel with a second reference plane this also defined by the support body and orthogonal in relation to the same first reference plane.

[0006] This design arrangement clearly defines the need to provide for 90° return means between the various levers, for instance between the safety lever and the safety control lever, which feature a reduced accuracy and relatively high wear loads, which result in a relatively poor lock performance.

[0007] In addition the known locks have a relatively

large number of components parts and consequently prove relatively complex and costly.

[0008] The purpose of the present invention is to achieve a lock for a motor vehicle door, which allows the disadvantages associated with the known aforesaid locks to be avoided.

[0009] The said purpose is achieved with the present invention, insofar as it relates to a lock for a motor vehicle door comprising a support body, a closure mechanism carried by the said support body and provided with a fork suitable for connection with a striker and a stop suitable for connection with the said fork to lock it in a releasable manner in a closure position on the said striker, and an actuation mechanism of the said closure mechanism, the said actuation mechanism comprising an external control lever which will connect with a door external handle to open the lock from the outside, a transmission lever interposed in a selectively releasable manner between the said external control lever and the said stop, lever safety means operationally connected to the said transmission lever and movable from an inhibition position, in which they arrange the said transmission lever in a release position between the said external control lever and the said stop preventing the opening of the lock, and an operational enabling position, wherein they arrange the said transmission lever in a securing position between the said external control lever and the said stop allowing the opening of the lock, an internal control lever connecting with an internal door handle to open the lock from the inside and movable in along an opening stroke between two operational positions, respectively of rest and of opening, and kinetic connecting means between the said internal control lever and the said safety means, active during a first portion of the said opening stroke of the said internal control lever to move the said safety means from the said inhibition position to the said enabling position, the said lock also including means for locking the said safety means and the said levers for transmission and internal and external control to the said support body, characterised by the fact that the said safety means comprise a single safety lever interacting with the said internal and external control levers, and in that the said securing means comprise a plurality of securing pins carried by the said support body and having axes parallel with each other and orthogonal in relation to a reference plane, the said transmission, safety and internal and external levers being movable in parallel with the said reference plane.

[0010] For a better understanding of the present invention a preferred form of implementation is described in the following, exclusively as a non-restrictive example and with reference to the appended drawings, wherein:

- figure 1 is an exploded perspective view of a modular type lock for a motor vehicle door produced according to the present invention;

- figure 2 is a part section enlarged scale side view, of the lock in figure 1 in a first operational configuration with certain parts removed for greater clarity;
- figure 3 is a part section enlarged scale side view, of the lock in figure 1 in a second operational configuration with certain parts removed for greater clarity;
- figure 4 is a plan view in part section of the lock in figure 2, with certain parts removed for greater clarity;
- figure 5 is a sectional view along line V-V in figure 2, and,
- figure 6 is an enlarged scale perspective view of the actuation mechanism of the lock in figure 1, with certain parts removed for greater clarity.

[0011] With reference to figures 1 to 4, reference 1 of the assembly indicates a motor vehicle door (not illustrated).

[0012] The lock 1 is of the modular type and essentially comprises a closure module 2 and an actuation module 5, designed to be assembled together to form an integral unit.

[0013] The closure module 2 is designed to be fixed to the said door and to cooperate with the cylindrical portion 3 of a fixed striker 4 integral with an upright of the door itself (not illustrated) and diagrammatically represented by the broken line in figure 5.

[0014] With reference to figures 1 to 5, the closure module 2 essentially comprises a casing 6 designed for fixing to the door and internally defining an aperture 7, and a closure mechanism 8 housed within the aperture 7 and in turn comprising a fork 9, movable between an operational opening position and an operational closure position (figure 5) on the portion 3 of the striker 4, and a stop 10 designed for spring-connecting with a peripheral edge 33 of the fork 9 to lock the fork 9 itself in a releasable manner in the closure position.

[0015] The actuation module 5 essentially comprises casing 11 coupled with the housing 6 and defining with it a lock 1 support body 35, and an actuation mechanism 13 located within an aperture 12 of the housing 11 and designed to cooperate with the closure mechanism 8. The actuation mechanism 13 comprises an internal control lever 15 which connects with an internal handle on the door and is movable along a relative opening stroke between a rest position (figure 2, continuous line) and a lock 1 opening position (figure 2, dotted line); an external control lever 16 connecting with a door external handle moving along a relative opening stroke between a resting position (figure 2, continuous line) and as lock 1 opening position (dotted line); a transmission lever 14 interposed in a selective manner releasable between the stop 10 and levers 15, 16; a safety lever 75 coupled in operational manner with the lever 14 and movable between an enabling position for the opening of the lock 1 (figure 2 and figure 3, dotted line), whereby the lever 14 has a securing position between the stop 10 and the

levers 15, 16 and a position of inhibition of the opening of the lock 1 (figure 3, continuous line), wherein the lever 14 has a release position between the stop 10 and the levers 15, 16; and kinetic coupling means between the levers 15 and 75 active during an initial portion of the opening stroke of lever 15 to displace lever 75 from the inhibiting position to the enabling position.

[0016] With particular reference to Figures 1 and 5 the envelope 6 of the closure module 2 is of prismatic form and has a reduced thickness in relation to the other dimensions. The envelope 6 has a sandwich-like structure and consists of an intermediate shell 20 made of plastic material and of a pair of metal base plate 21, 22 of polygonal form mounted on opposing parts on the shell 20 and demarcating with it the aperture 7. The shell 20 has a pair of longitudinal flat sides 23, 24, facing away from each other and extended in service in the vertical direction, and a pair of sides 25, 26 of split form, connecting the sides 23 and 24 between them.

[0017] The envelope 6 also has a side aperture arranged 27 to allow the penetration of portion 3 of the striker 4 into the aperture 7, recessed in particular in the side 24 of the shell 20 and in plate 21.

[0018] The fork 9 and the stop 10 are hinged about respective fixed pins 28, 29 carried integrally by the plates 21, 22 around the aperture 7 and having respective axes A, B parallel with each other and orthogonal with the said plates 21, 22.

[0019] The fork 9, consists of a moulded metal plate coated with plastic material and essentially parallel with plates 21, 22 and hinged to match an intermediate portion about the pin 28 and has a peripheral C-shaped seat 30 arranged to receive the portion 3 of the striker 4 and demarcated laterally by a pair of teeth 31, 32.

[0020] The fork 9 pivots about axis A between the opening position (not illustrated) in which the seat 30 is turned towards the aperture 27 of the envelope 6 and thus allows the disengagement of portion 3 of the striker 4 from the closure mechanism 2, and the closure position (Figure 5), in which the portion 3 of the striker 4 is locked in the seat 30 and the tooth 31 intercepts in a known manner the aperture 27 preventing its escape; the fork 9 is also pushed in a known manner towards the opening position by a spring 36 wound around the pin 28 and secured to the fork 9 and to a portion 37 indicated in dotted lines in Figure 5 of the envelope 6.

[0021] The stop 10 comprises a metal engaging component 38, hinged about the pin 29 and arranged to cooperate by detent with the edge 33 of the fork 9, and an actuation arm 39 made of plastic material, having an actuating component 45 arranged to cooperate with the transmission lever 14, hinged about the pin 29 and angularly coupled with the engaging component 38 by means of a pair of keyed components 40, 41. The stop 10 is also pushed towards the fork 9 by a spring 42 wound around the pin 29 and secured to the stop 10 and a portion 43, indicated with dotted lines in Figure 5, of the envelope 6.

[0022] In particular, the engaging component 38 consists of a plate essentially coplanar with the fork 9 and has an end edge 44 in L-shape and arranged for spring coupling with a shoulder 34 on the edge 33 of the fork 9 to lock in releasable manner the said fork 9 in the closure position.

[0023] The actuation arm 39 has an elongated shape in a transverse direction to axis B of pin 29 and to sides 23, 24 of the shell 20, is superimposed over the engaging component 38 and extends for the whole of the width of the envelope 6 between the said sides 23, 24. More particularly, the actuation arm 39 has in the direction of maximum extension, a length essentially equal to twice the length of the engaging component 38 in the same direction; the actuation arm 39 is hinged about pin 29 to match its end adjacent to the side 23 and carries integrally in overhang, to match one of its opposing ends adjacent to side 24, the actuation component 45, which consists of a projection with an axis F parallel with axes A, B.

[0024] The actuation arm 39 also has, a first portion 46 hinged about pin 29 and located superimposed and in contact with the engaging component 38, and a second portion 47 projecting longitudinally in relation to the engaging component 38, bearing the actuation component 45 and arranged offset in relation to fork 9 in a parallel direction to axes A, B, so as to avoid interfering with the rotation of the said fork 9.

[0025] With reference to Figures 1 to 4, the envelope 11 of the actuation module 5 has an essentially prismatic structure and similarly to envelope 6, a reduced thickness in relation to the other dimensions. The envelope 11, suitably made of plastic material, is demarcated by two base walls 50, 51, essentially parallel with each other and a side wall 52, essentially consisting of a flat longitudinal side 53, of two flat transverse sides 54a, 54b extending in orthogonal manner from a respective opposing end of the side 53, and a moulded side 55 facing away from side 53 and connected to its relevant ends opposing sides 54a, 54b.

[0026] When the lock 1 is assembled, the envelope 11 is knife-edge mounted on the envelope 6 with its flank 53 placed in contact with plate 22 and extending in proximity and over the whole length of the side 24 of the shell 20, wherein the aperture 27 is recessed. Thanks to the reduced thickness of the envelope 11, due to the parallelism of the levers 14, 15, 16 and 75 of the actuation mechanism 13, and the arrangement of the envelope 11 in the proximity of the aperture 27, the actuation module 5 is located in service inside a lower aperture (not shown) of the door in a position interposed between the motor car body cell and a window (not illustrated) in the said door, making any unauthorised opening of the lock 1 particularly difficult, more so in the case of access to the said aperture by the insertion of breaking-in tools between the window and the relevant seals.

[0027] With reference to Figures 2, 3, 4 and 6, the transmission lever 14 is of elongated shape and essen-

tially flat, and suitably made of plastic material, and located essentially parallel with the walls 50, 51, and extends transversely to the side 53 of the envelope 11 and the plate 22.

[0028] The lever 14 has a passing intermediate longitudinal slot 57, internally closed with a relief edge 86 in relation to the face of the lever 14 turned towards the wall 50. The slot 57 is engaged by a fixed pin 56, carried integrally by the walls 50 and 51 and having an orthogonal axis G to the walls 50, 51 and to axes A, B.

[0029] Lever 14 also has corresponding with one end, an interaction portion 58 with the operating component 45 of the stop 10, engaging when the lock 1 is assembled respective passing apertures 59, 60 coaxial one to the other, a first (59) of which is recessed in the side 53 of the envelope 11, whereas the other (60) is recessed in the plate 22 of the envelope 6 and faces away from the actuating component 45 of the stop 10; the portion 58 of the lever 14 is arranged to push-cooperate with the actuating component 45 to move it in unidirectional manner along the trajectory C and to determine the decoupling of the stop 10 from fork 9.

[0030] The lever 14 has a parallel movement with a reference plane π orthogonal with axis G, parallel with axes A, B and defined by the wall 50 of the envelope 11; more specifically, the lever 14 is arranged to rotate about axis G between the limits imposed by the dimensions of the apertures 59, 60 engaged by portion 58, and is arranged to move longitudinally in transverse direction to axis G, between the limits imposed by the dimensions of the slot 57, between the securing position, in which it is located with its portion 58 projecting from the envelope 11 inside the envelope 6 and in line with the actuating component 45, and the release position, in which the portion 58 does not project inside the envelope 6 and is thus not aligned with the actuation component 45.

[0031] The lever 14 is retained by a traction spring 61 in a rest position (Figures 2 and 3), in which its portion 58 bears against a rest component 62 integral with the envelope 11 and extending transversely to the side 53 towards the inside of the envelope 11 itself starting from a side edge of the aperture 59; in particular the spring 61 has an axis transverse to sides 54a, 54b of the envelope 11 and the direction of extension of lever 14 and is secured at one end to a pin 63 carried to project from the wall 50 at the opposing end to lever 14 in close proximity with portion 58.

[0032] The lever 14 finally has an end-piece 64 or control arm, projecting and overhanging from an opposing end to portion 58 and is arranged to cooperate with the internal and external control levers respectively 15, 16 as will be detailed in the following; more specifically the end piece 64 projects from a face of the lever 14 turned towards the wall 51.

[0033] The internal control lever 15, suitably made of plastic material, is essentially flat and hinged about pin 56, and located essentially parallel with walls 50, 51 and

lever 14 and extends in a transverse direction to the said lever 14.

[0034] Lever 15 has an end portion 66 externally projecting from the envelope 11 to a relative passing aperture 67 (Figure 4), recessed in the side 54a and arranged to be secured to a tie-rod (known and not illustrated) connected with the internal handle of the door.

[0035] The lever 15 is held in the rest position by a conventional type spring not illustrated here, in which the portion 66 cooperates with an end of the aperture 67 turned towards to the closure module 2.

[0036] The lever 15 pivots about the pin 56 in parallel with the reference plane π between the rest and opening positions, and along its peripheral edge has a projection 65 arranged to push-cooperate with end-piece 64 to rotate the lever 14 about the pin 56.

[0037] The external control lever 16 is suitably made of clipping and pressing sheet and comprises a flat main body 68 extending parallel with levers 14 and 15, on the side opposing lever 15 as related to lever 14 (figure 6), and in a transverse direction to the side 53 of the envelope 11.

[0038] The lever 16 is hinged about the envelope 11 at one end 71 of the body 68, by means of a pin 73 supported in a projection 72 of the envelope 11 opposite the side 53; the pin 73 has an axis M orthogonal to the walls 50, 51 and thereby to the reference plane π .

[0039] The lever 16 also comprises an essentially flat arm 69 extending in orthogonal manner from one end of the body 68 opposite the end 71, externally projecting from the envelope 11 through a passing aperture 70 (figure 1) of wall 51 and arranged to be secured to a tie-rod (known and not illustrated) connected to the external handle of the door.

[0040] The lever 16 also has along a peripheral edge of the body 68, a rounded projection 74 arranged to push-cooperate with the end-piece 64 of the lever 14 to rotate the latter about the axis G.

[0041] The lever 16 pivots about the axis M in parallel with the reference plane π between the resting and opening positions, and is normally held in the resting position, by a spring of known type and not illustrated, wherein it cooperates with the side wall 52 of the envelope 11.

[0042] The lever 75 is hinged about a pin 76 rigidly fixed between the walls 50 and 51 of the envelope 11 and having an axis N orthogonal with the walls 50, 51 and thereby the reference plane π . The lever 75 pivots about the axis N in parallel with the reference plane π between the enabling and the inhibiting positions and is positioned on the opposing side of lever 14 as related to lever 15.

[0043] The lever 75 is made of clipping strip and comprises a main body 77 hinged in the intermediate position, about pin 76 and located parallel with the walls 50, 51, levers 14, 15 and the body 67 of lever 16.

[0044] Also, lever 75 comprises an end-arm 78 extending orthogonal and overhanging the body 77,

projecting from the envelope 11 through a passing aperture 79 recessed in the wall 51, and ending in a ball-joint 80 arranged to be connected in service with a lever system (not illustrated) operated by means of a key from the outside of the vehicle.

[0045] In particular, the body 77 comprises an elongated portion 81 in transverse direction to the sides 54a, 54b of the envelope 11 and having an end-stretch 82 adjacent to the side 54b and secured to a two-way spring 83 of known type anchored to the wall 50, and an opposing end-stretch 84 having a passing hole 85 with a clearance 86 in relief from the lever 14.

[0046] From one side of the portion 81 turned towards the side 53 of the envelope 11, the arm 78 extends, whereas on the opposing side extended in co-planar relation with the said portion 81, two arms 87, 88 of differing lengths, project externally from the envelope 11 through respective apertures 89, 90 recessed in the side 55 of the envelope 11, and serving as connection with a manual insertion knob for setting the safety means from inside the vehicle respectively if the lock 1 is fitted to a forward door or if the lock 1 is fitted to a rear door.

[0047] The spring 83 is arranged to stabilise the enabling and inhibiting positions for lever 75. In the enabling or disconnected safety position, lever 75 is rotated slightly clockwise in figures 2 and 3, as the end-stretch 84 is slightly inclined towards the side 53 of envelope 11 and thanks to the edge 86 engaged in the hole 85, it maintains the lever 14 in the secured position; the angular stop for the lever 75 is determined by contact with the edge 86, in turn bearing against the pin 56, which takes up an end-portion of the slot 57.

[0048] In the inhibiting or connected safety position, lever 75 rotates slightly anti-clockwise in figures 2 and 3, as the end-stretch 84 is slightly inclined towards the side 55 of envelope 11 and thanks to the edge 86 engaged in the hole 85, it maintains the lever 14 in the released position; the angular stop for the lever 75 is also determined by contact with the edge 86, in turn bearing position against the pin 56 which occupies an opposing end portion of the slot 57.

[0049] Finally, the kinetic coupling means comprise a tooth 91 projecting from and overhanging the body 77 of the lever 75 in close proximity to the pin 76 and a cam end-portion 92 of lever 15 opposite portion 66 and arranged to cooperate with tooth 91. In particular, in the enabling position for lever 75 and during rotation of the lever 15 about the pin 56, the portion 92 is arranged to cooperate by friction with the tooth 91 along the external profile of the latter; vice-versa, in the inhibition position of lever 75 and during rotation of the lever 15, the portion 92 is arranged to intercept the tooth 91 and to exert a pushing action thereupon to rotate lever 75 in the enabling position.

[0050] Operation of the lock 1 is described on the basis of figure 2 (continuous line), in which the lock 1 is closed (portion 3 of the striker 4 is locked in the seat 30 of the fork 9, whose rotation is prevented by the stop

(10) and the safety means are disconnected.

[0051] Opening of the lock 1 from the outside of the vehicle is obtained by reaction on external control lever 16, by means of the door external handle, as illustrated in figure 2. Clockwise rotation of the lever 16 about axis M from the rest position to the opening position defines a pushing action of the projection 74 on the end-piece 64 of the lever 14, which is thus rotated in anti-clockwise direction about the pin 56; during the rotation of the lever 14, portion 58 cooperates by push action with the operating component 45 of the actuation arm 39 of the stop 10, moving it along trajectory C and thus determining an anticlockwise rotation of the stop 10 about axis B in anti-clockwise direction in Figure 5. The said rotation determines the disconnection of the engaging component 38 from the shoulder 34 of the fork 9, which is thus free to rotate towards its opening position under the impulse of the spring 36, releasing portion 3 from the striker 4.

[0052] Closure of the lock 1, from the outside or the inside of the motor vehicle is achieved by simply slamming the door; this causes an impact of portion 3 of the striker 4 upon the tooth 32 of the fork 9, which rotates about axis A against the pressure of the spring 36 until the closure position is reached and it is locked in that position by the stop 10 following the snap-connection between the angle 44 and the shoulder 34.

[0053] Insertion of the safety means can be effected from the outside by means of a key, or from the inside by means of a knob. In the first case the key reacts on the ball-joint 80 of the safety lever 75 and determines the anti-clockwise rotation of that lever about axis N as in figure 3, from the enabling position (dotted lines) to the inhibition position (continuous line). That rotation moves the lever 14 from the secured position to the release position running it along the rest component 62; the movement sets out of line the portion 58 from the lever 14 of the actuating component 45; by reacting on the external control lever 16, there is thus a void movement of the lever 14, which is unable to cooperate with the stop 10.

[0054] Insertion of the safety means from the inside is achieved by way of the knob on the arm 87, in the case of the forward door, or by way of the arm 88 in the case of a rear door; in both cases there is a lever 75 movement identical to that seen in the case of the insertion of the safety means by way of the key.

[0055] Opening from the inside is effected by means of the internal handle, reacting on the internal control lever 15 and producing a rotation about the pin 56 in anti-clockwise direction as in figures 2 and 3 from the rest position to the opening position.

[0056] If the safety means is set (figure 3, continuous lines), during the initial portion of the opening stroke of the lever 15 about the axis G, the cam portion 92 of the lever 15 cooperates by pressure with the tooth 91 of the lever 75 until the lever 75 is moved into the enabling position; the initial and final positions of the lever 15 in

this phase of operations are shown in figure 3, in continuous line and in dotted lines respectively. From then on, the projection 65 on the lever 15 cooperates with the end-piece 64 of the lever 14, defining in analogous manner with that previously seen regarding opening from outside, the movement of the actuation component 45 along the trajectory C and the disconnection of the engaging component 38 from the stop 10 of the fork 9.

[0057] Opening occurs in analogous manner when the safety means is not set (figure 2); in the event, there is a void movement of lever 15 along the initial portion of the opening stroke, until the projection 65 is brought into contact with the end-piece 64 of the lever 14.

[0058] An examination of the characteristics of the lock 1 built according to the invention clearly shows the advantages that it allows.

[0059] In particular, the fact that levers 14, 15, 16, 75 of the actuation mechanism 13 all move in parallel with each other, as opposed to known locks, allows the elimination of 90° transmissions, with consequent improvements in the accuracy of the various connections, reductions in wear and improvement in performance of the lock 1. In addition, since the internal and external control levers 15, 16 move in parallel with each other, it is no longer necessary to double up on safety mechanisms with two interacting levers, as in known locks, and a single safety lever 75 is sufficient; this consequently allows a reduction in the overall number of levers in the lock 1 (in particular, the actuation mechanism 13 simply consists of four levers only) compared with known locks, with consequent simplification of the actual lock 1.

[0060] Finally it is clear that the lock 1 allows modifications and variations without going outside the protective scope of the present invention.

[0061] In particular, the lock 1 could be fitted to the upright of the door and could cooperate with a striker which is integral with the door itself.

Claims

1. Lock (1) for the door of a motor vehicle comprising a support body (35), a closure mechanism (8) carried by the said support body (35) and provided with a fork (9) designed to be connected with a striker (4) and a stop (10) designed to be connected with the said fork (9) to lock it in a releasable manner in a closure position on the said striker (4), and an actuation mechanism (13) for the said closure mechanism (8), the said actuation mechanism (13) comprising an external control lever (16) which may be connected to an external handle on the door to open the lock (1) from the outside, a transmission lever (14) interposed in a selectively releasable manner between the said external control lever (16) and the said stop (10), lever safety means (75) operationally connected to the said transmission lever (14) and movable an inhibiting position, in which they arrange the said transmission lever (14)

in a release position between the said external control lever (16) and the said stop (10) preventing the opening of the lock (1), and an operative enabling position, in which they arrange the said transmission lever (14) in a securing position between the said external control lever (16) and the said stop (10) allowing the lock (1) to be opened, an internal control lever (15) connecting with an internal handle on the door to open the lock (1) from the inside and movable along an opening stroke between two operational positions, of rest and opening respectively, and kinetic connecting means (93) between the said internal control lever (15) and the said safety means (75), active during a first portion of the said opening stroke of the said internal control lever (15) in order to move the said safety means (75) from the said inhibition position to the said enabling position, the said lock (1) comprising in addition securing means (76,56,73) of the said safety means (75) and of the said transmission levers (14) and internal and external control levers (15,16) to the said support body (35),

characterised by the fact that the said safety means comprise a single safety lever (75) interacting with the said internal and external control levers (15,16) and that the said securing means comprise a plurality of securing pins (56,73,76) carried by the said support body (35) and having axes (G,M,N) parallel with each other and orthogonal in relation with a reference plane (π), the said transmission, safety and internal and external control levers (14,75,15,16) being movable in parallel with the said reference plane (π).

2. Lock according to claim 1, characterised by the fact that the said fork (9) and the said stop (10) are hinged about restive articulation pins (28,29) having axes (A, B) parallel with each other and with the said reference plane (π).
3. Lock according to claim 1 or 2, characterised by the fact that the said support body (35) comprises a first and a second envelope (6,11) connected together, respectively housing the said closure mechanism (8) and the said actuation mechanism (13) and defining respectively with the closure and actuation mechanisms (8,13) a closure module (2) and an actuation module (5) for the said lock (1), the said first and second envelopes (6, 11) respectively involving a first and second aperture (60, 59) communicating with each other and arranged to allow an interaction between the said transmission lever (14) and the said stop (10), the said first envelope (6) involving in addition a third aperture (27) to allow the introduction of the said striker (4) in the first envelope (6) and connection with the said fork (9), the said second envelope (11) representing in addition a plurality of four apertures

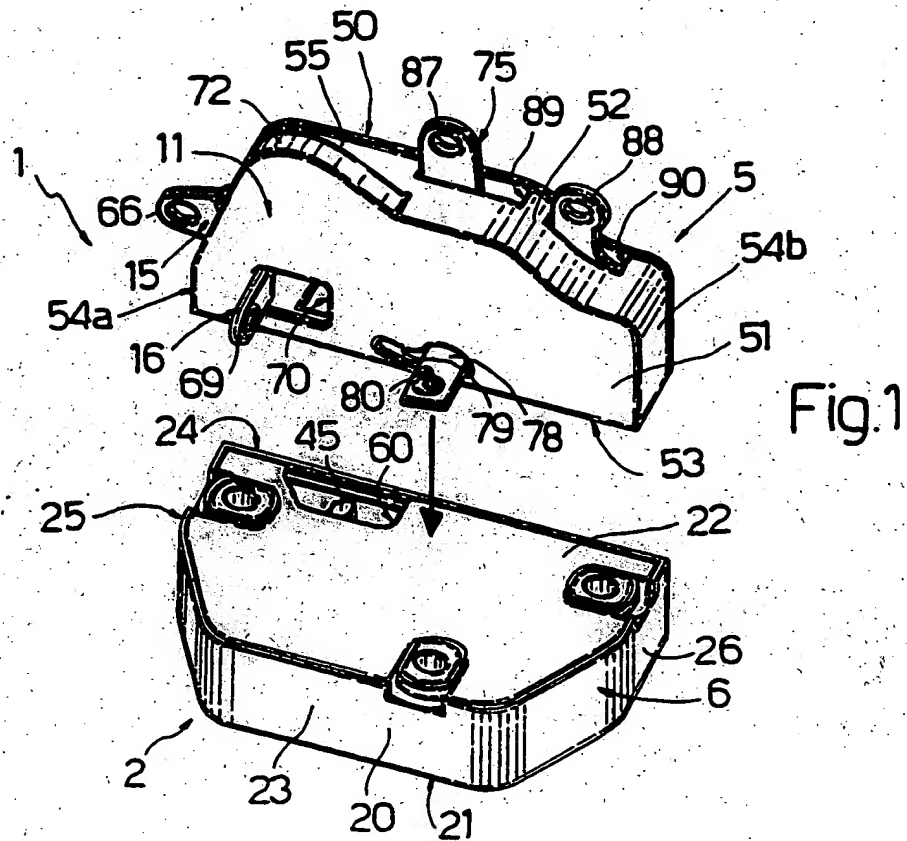
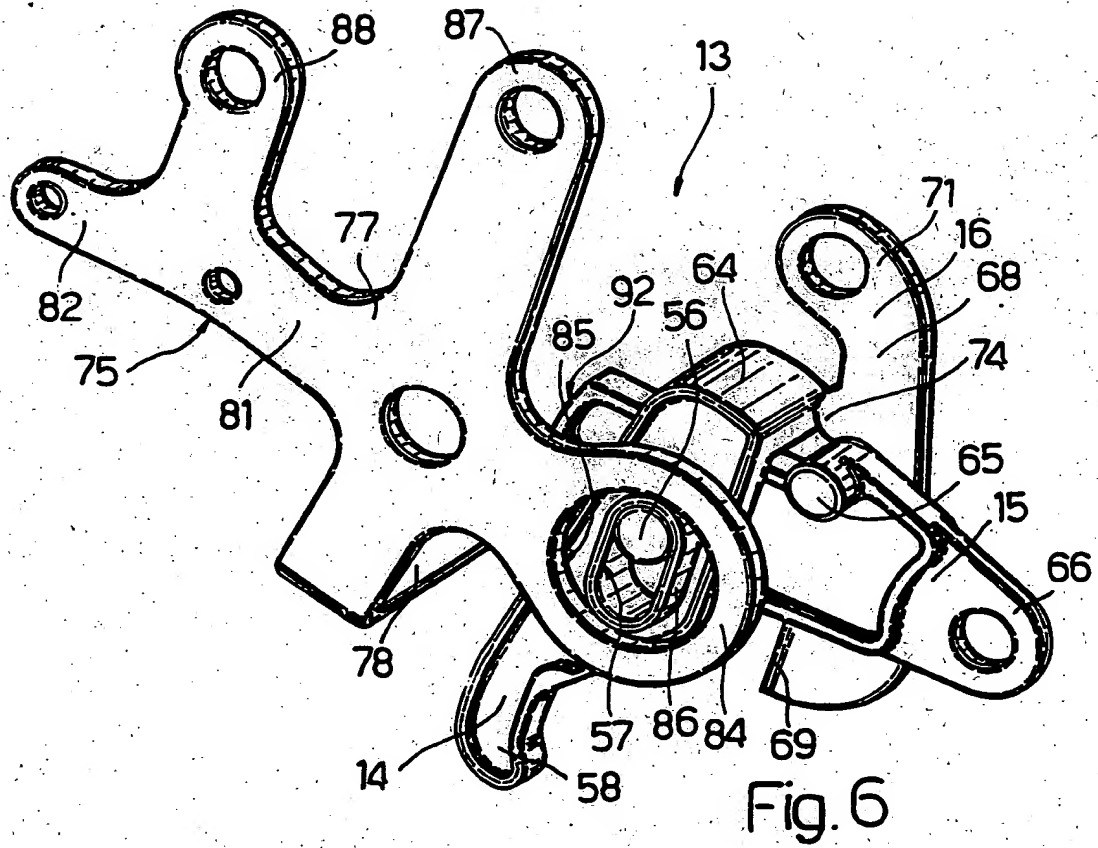
(79,89,90,67,70) to allow the exit of the respective portions of the ends (78, 87, 88, 66, 69) of the said safety levers (75) and internal and external control levers (15, 16).

4. Lock according to claim 3, characterised by the fact that the said second envelope (11) is fitted on the said first envelope (6) in part whereof the said third aperture (27) is recessed.
5. Lock according to claim 4, characterised by the fact that the said first and a second envelope (6,11) are of essentially prismatic form with a reduced thickness compared with the other dimensions, the said second envelope (11) being knife-edge mounted on the said first envelope (6) with a lateral part (53) placed in contact with a base wall (22) of the first envelope (6) in the proximity of the said third aperture (27), the said first and second apertures (60, 59) being recessed respectively in the said base wall (22) of the said first envelope (6) and in the said side section (53) of the said second envelope (11).
6. Lock according to any one of claims 3 to 5, characterised by the fact that the said transmission lever (14) is of elongated shape and in the intermediate position has a passing slot (57) engaging with a first (56) of the said securing pins (56, 73, 76), and at one of its ends, an interacting portion (58) arranged to push cooperate with an actuating component (45) of the said stop (10) to move in unidirectional manner the actuating component (45) along a pre-determined trajectory (C) and determine the disengagement of the said stop (10) from the said fork (9), the said transmission lever (14) being arranged to rotate about the first securing pin (56) and arranged to transfer longitudinally between the limits imposed by the dimensions of the said slot (57) between the said securing position, in which the said interacting portion (58) projects from the said second envelope (11) inside the first said envelope (6) through the said first and second apertures (60, 59) and is aligned with the said operating component (45), and the said release position, in which the said interaction portion (58) is out of line with the said operating component (45).
7. Lock according to claim 6, characterised by the fact that the said transmission lever (14) is essentially parallel with the said reference plane (π) and has a control arm (64) projecting to overhang by its end opposing the said interaction portion (58) and arranged to cooperate with at least the said external control lever (16).
8. Lock according to claim 7, characterised by the fact that the said external control lever (16) is essentially parallel with the said reference plane (π) and has an

end portion (71) hinged to a second (73) of the said securing pins (56, 73, 76) and an opposing end portion (69) projecting from the said second envelope (11) through a relative said fourth aperture (70) and arranged to be connected to the external handle of the door, the said external control lever (16) comprising first intermediate pressure means (74) arranged to cooperate with the said control arm (64) of the said transmission lever (14) itself to rotate the transmission lever (14) around the said first securing pin (56).

9. Lock according to claim 7 or 8, characterised by the fact that the said internal control lever (15) is essentially parallel with the said reference plane (π), is hinged about the said first securing pin (56) and comprises an end portion (66) coming out of the second envelope (11) through a relative said fourth aperture (67) and arranged to be connected with the internal handle of the door, and second pressure means (65) interposed between the said first securing pin (56) and the said end portion (66) and arranged to cooperate with the said control arm (64) of the said transmission lever (14) to rotate the transmission lever (14) itself around the said first securing pin (56).
10. Lock according to any one of claims 7 to 9, characterised by the fact that the said safety lever (75) is essentially parallel with the said reference plane (π), and hinged about a third (76) of the said securing pins (56, 73, 76), and comprises at least a first and a second end-portion (87, 88; 78) coming out of the second envelope (11) through respective said fourth apertures (89, 90; 79) and arranged to be connected respectively to manual control means from the inside of the motor vehicle and control means by way of a key from the outside of the vehicle, the said slot (57) of the said transmission lever (14) being held by an edge (86) in relief engaging with a clearance in a passing hole (85) of the said safety lever (75).
11. Lock according to any one of the preceding claims, characterised by the fact that the said kinetic connection means (93) comprise a tooth (91) projecting from and overhanging the said safety lever (75) and a cam portion (92) of the said internal control lever (15) arranged to cooperate by pressure with the said tooth (91).
12. Lock according to any one of claims 6 to 12, characterised by the fact that the said stop (10) comprises an engaging component (38) hinged about the said relative articulation pin (29) and arranged to snap-connect with the said fork (9), an operating arm (39) also hinged about the said articulation pin (29) of the said engaging component (38) and inte-

grally carrying by overhang the said actuating component (45), and means of angular connection (40, 41) between the said engaging component (38) and the said operating arm (39).



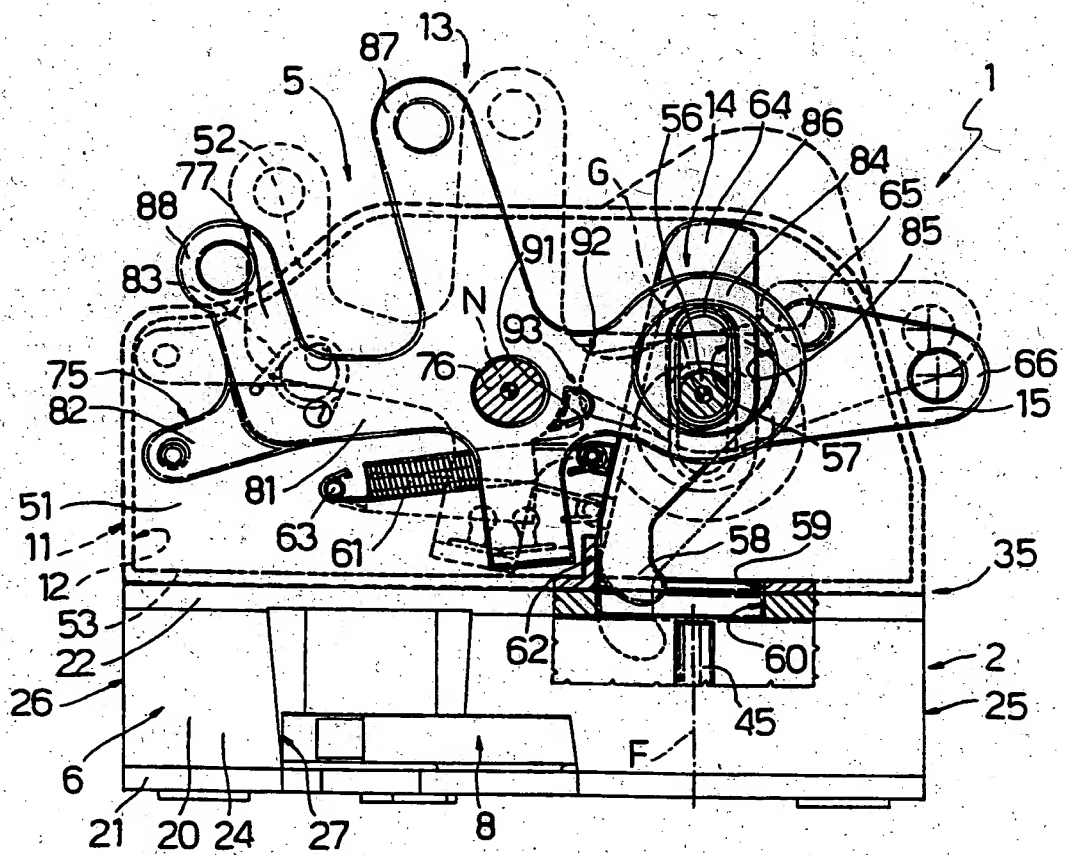


Fig. 3

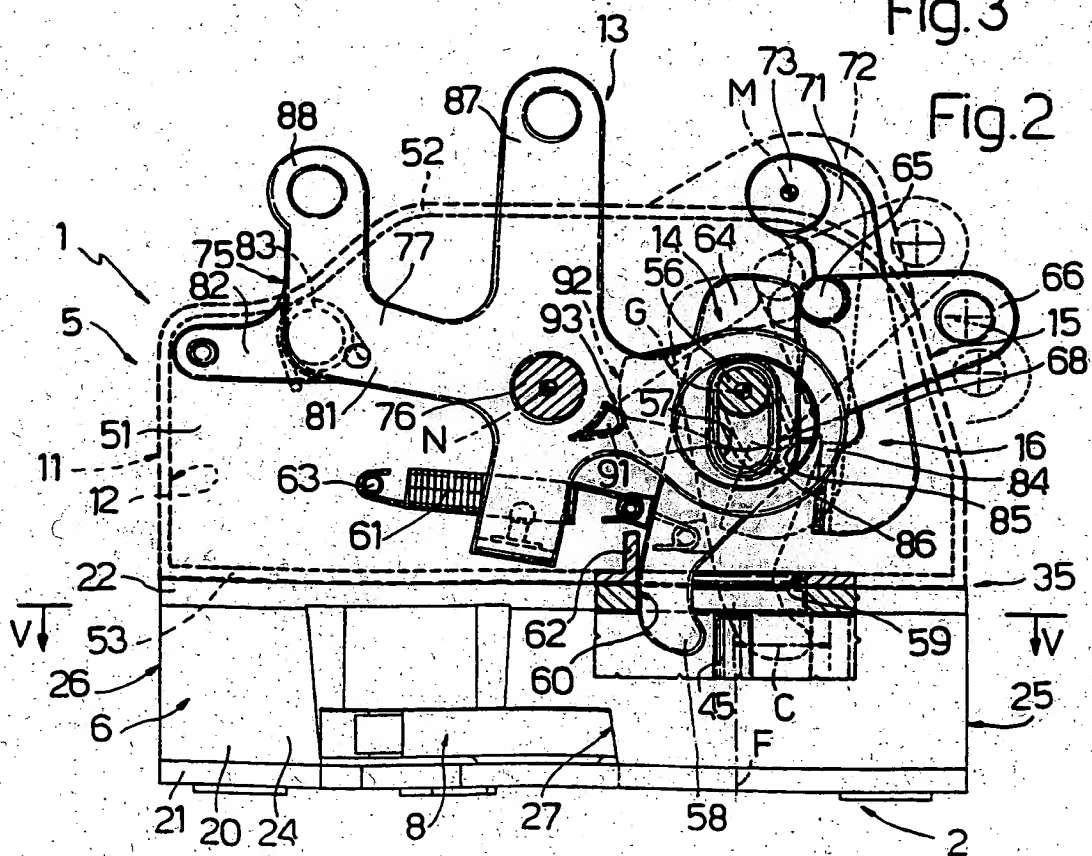


Fig. 2

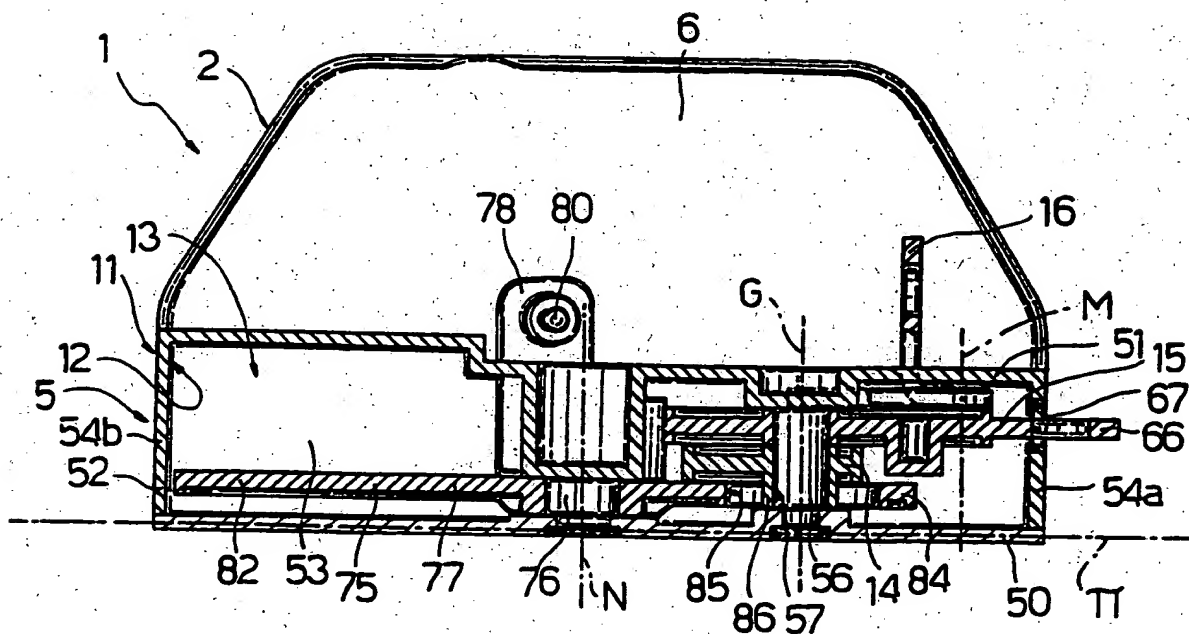


Fig. 4

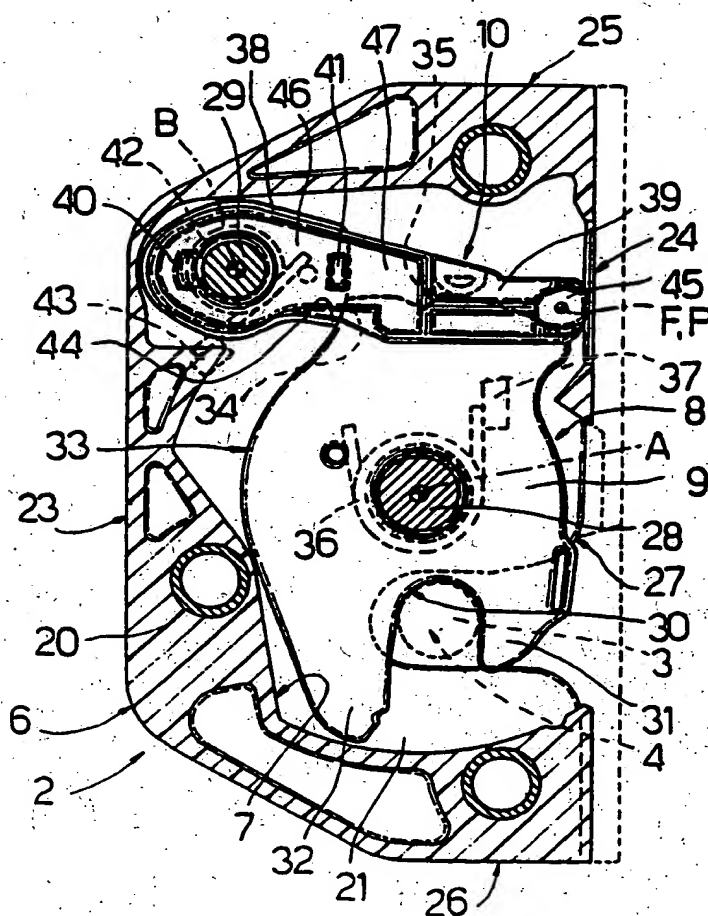


Fig. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 11 4294

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 4 904 004 A (BARTCZAK ANDRZEJ) 27 February 1990 * column 7, line 11 - column 12, line 34; figures *	1-5, 11	E05B65/20 E05B65/32
A	EP 0 632 178 A (ROLTRA MORSE SPA) 4 January 1995 * column 1, line 51 - column 4, line 22; figures *	1	
A	DE 36 26 441 C (BMW AG) 24 September 1987 * column 2, line 29 - column 4, line 62; figures *	1, 2	
A	DE 44 34 167 C (KIEKERT AG) 21 March 1996 * column 2, line 21 - column 4, line 42; figures *	1, 2	
A	FR 2 534 617 A (VACHETTE SA) 20 April 1984 * page 6, line 18 - page 7, line 2 * * page 9, line 12 - page 19, line 2; figures *	1, 2	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E05B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 9 November 1998	Examiner Westin, K
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 03 82 (P04C01)